

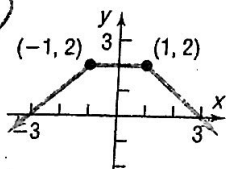
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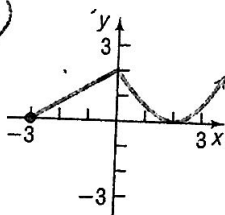
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# Functions + Their Graphs Practice

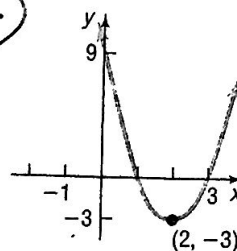
19.



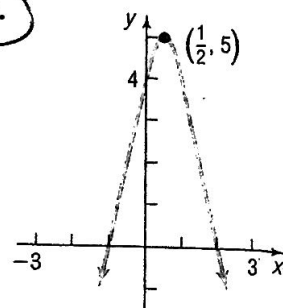
20.



21.



22.



For #19-22

- (a) Give domain + range  
(b) Give intercepts (x and y)

In Problems 23-28, answer the questions about the given function.

23.  $f(x) = 2x^2 - x - 1$

- (a) Is the point  $(-1, 2)$  on the graph of  $f$ ?  
(b) If  $x = -2$ , what is  $f(x)$ ? What point is on the graph of  $f$ ?  
(c) If  $f(x) = -1$ , what is  $x$ ? What point(s) are on the graph of  $f$ ?  
(d) What is the domain of  $f$ ?  
(e) List the  $x$ -intercepts, if any, of the graph of  $f$ .  
(f) List the  $y$ -intercept, if there is one, of the graph of  $f$ .

24.  $f(x) = -3x^2 + 5x$

- (a) Is the point  $(-1, 2)$  on the graph of  $f$ ?  
(b) If  $x = -2$ , what is  $f(x)$ ? What point is on the graph of  $f$ ?  
(c) If  $f(x) = -2$ , what is  $x$ ? What point(s) are on the graph of  $f$ ?  
(d) What is the domain of  $f$ ?  
(e) List the  $x$ -intercepts, if any, of the graph of  $f$ .  
(f) List the  $y$ -intercept, if there is one, of the graph of  $f$ .

25.  $f(x) = \frac{x+2}{x-6}$

- (a) Is the point  $(3, 14)$  on the graph of  $f$ ?  
(b) If  $x = 4$ , what is  $f(x)$ ? What point is on the graph of  $f$ ?  
(c) If  $f(x) = 2$ , what is  $x$ ? What point(s) are on the graph of  $f$ ?  
(d) What is the domain of  $f$ ?  
(e) List the  $x$ -intercepts, if any, of the graph of  $f$ .  
(f) List the  $y$ -intercept, if there is one, of the graph of  $f$ .

26.  $f(x) = \frac{x^2 + 2}{x + 4}$

- (a) Is the point  $(1, \frac{3}{5})$  on the graph of  $f$ ?

- (b) If  $x = 0$ , what is  $f(x)$ ? What point is on the graph of  $f$ ?

- (c) If  $f(x) = \frac{1}{2}$ , what is  $x$ ? What point(s) are on the graph of  $f$ ?

- (d) What is the domain of  $f$ ?  
(e) List the  $x$ -intercepts, if any, of the graph of  $f$ .  
(f) List the  $y$ -intercept, if there is one, of the graph of  $f$ .

27.  $f(x) = \frac{2x^2}{x^4 + 1}$

- (a) Is the point  $(-1, 1)$  on the graph of  $f$ ?  
(b) If  $x = 2$ , what is  $f(x)$ ? What point is on the graph of  $f$ ?  
(c) If  $f(x) = 1$ , what is  $x$ ? What point(s) are on the graph of  $f$ ?  
(d) What is the domain of  $f$ ?  
(e) List the  $x$ -intercepts, if any, of the graph of  $f$ .  
(f) List the  $y$ -intercept, if there is one, of the graph of  $f$ .

28.  $f(x) = \frac{2x}{x-2}$

- (a) Is the point  $(\frac{1}{2}, -\frac{2}{3})$  on the graph of  $f$ ?  
(b) If  $x = 4$ , what is  $f(x)$ ? What point is on the graph of  $f$ ?  
(c) If  $f(x) = 1$ , what is  $x$ ? What point(s) are on the graph of  $f$ ?  
(d) What is the domain of  $f$ ?  
(e) List the  $x$ -intercepts, if any, of the graph of  $f$ .  
(f) List the  $y$ -intercept, if there is one, of the graph of  $f$ .

be increased. If a player shoots an underhand foul shot, releasing the ball at a 70-degree angle from a position 3.5 feet above the floor, then the path of the ball can be modeled

by the function  $h(x) = -\frac{136x^2}{v^2} + 2.7x + 3.5$ , where  $h$  is the height of the ball above the floor,  $x$  is the forward distance of the ball in front of the foul line, and  $v$  is the initial velocity with which the ball is shot in feet per second.

- The center of the hoop is 10 feet above the floor and 15 feet in front of the foul line. Determine the initial velocity with which the ball must be shot in order for the ball to go through the hoop.
- Write the function for the path of the ball using the velocity found in part (a).
- Determine the height of the ball after it has traveled 9 feet in front of the foul line.
- Find additional points and graph the path of the basketball by hand.

Source: *The Physics of Foul Shots*, Discover, Vol. 21, No. 10, October 2000

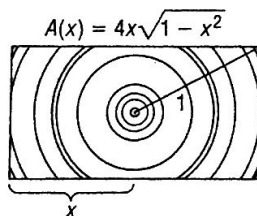
**Cost of Trans-Atlantic Travel** A Boeing 747 crosses the Atlantic Ocean (3000 miles) with an airspeed of 500 miles per hour. The cost  $C$  (in dollars) per passenger is given by

$$C(x) = 100 + \frac{x}{10} + \frac{36,000}{x}$$

where  $x$  is the ground speed (airspeed  $\pm$  wind).

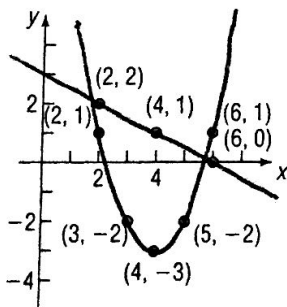
- Use a graphing utility to graph the function  $C = C(x)$ .
- Create a TABLE with TblStart = 0 and  $\Delta\text{Tbl} = 50$ .
- To the nearest 50 miles per hour, what ground speed minimizes the cost per passenger?

**Cross-sectional Area** The cross-sectional area of a beam cut from a log with radius 1 foot is given by the function  $A(x) = 4x\sqrt{1-x^2}$ , where  $x$  represents the length, in feet, of half the base of the beam. See the figure.



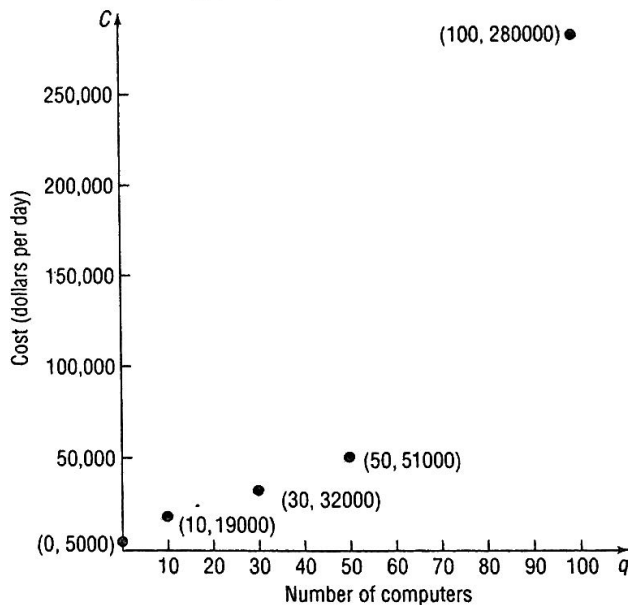
- Find the domain of  $A$ .
- Use a graphing utility to graph the function  $A = A(x)$ .
- Create a TABLE with TblStart = 0 and  $\Delta\text{Tbl} = 0.1$  for  $0 \leq x \leq 1$ . Which value of  $x$  maximizes the cross-sectional area? What should be the length of the base of the beam to maximize the cross-sectional area?

33. The graphs of two functions,  $f$  and  $g$ , are illustrated. Use the graphs to answer parts (a)–(f).



- $(f + g)(2)$
- $(f + g)(4)$
- $(f - g)(6)$
- $(g - f)(6)$
- $(f \cdot g)(2)$
- $\left(\frac{f}{g}\right)(4)$

34. **Reading and Interpreting Graphs** Let  $C$  be the function whose graph is given below. This graph represents the cost  $C$  of manufacturing  $q$  computers in a day.

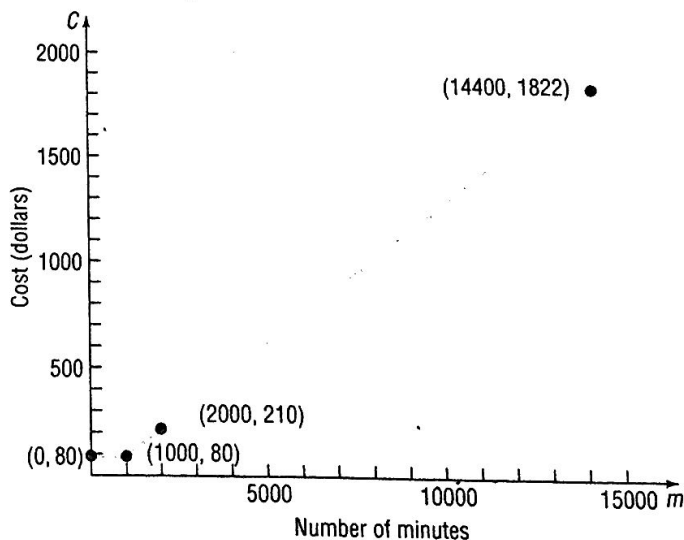


- Determine  $C(0)$ . Interpret this value.
- Determine  $C(10)$ . Interpret this value.
- Determine  $C(50)$ . Interpret this value.
- What is the domain of  $C$ ? What does this domain imply in terms of daily production?

Describe the shape of the graph.

The point  $(30, 32000)$  is called an *inflection point*. Describe the behavior of the graph around the inflection point.

35. **Reading and Interpreting Graphs** Let  $C$  be the function whose graph is given below. This graph represents the cost  $C$  of using  $m$  anytime cell phone minutes in a month for a five-person family plan.



- Determine  $C(0)$ . Interpret this value.
  - Determine  $C(1000)$ . Interpret this value.
  - Determine  $C(2000)$ . Interpret this value.
  - What is the domain of  $C$ ? What does this domain imply in terms of the number of anytime minutes?
- Describe the shape of the graph.